PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference -?-	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/GB2004/003533	International filing date *(day/month/year)* 17.08.2004	Priority date *(day/month/year)* 18.08.2003
International Patent Classification (IPC) or national classification and IPC H01J23/38, H01J25/593		
Applicant E2V TECHNOLOGIES (UK) LIMITED et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
04.11.2005	19.01.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Lang, T Telephone No. +49 89 2399-2594

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/003533

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-10 as originally filed

   Claims, Numbers

   1-18 as originally filed

   Drawings, Sheets

   1/8-8/8 as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	13,14
	No:	Claims	1-12,15-18
Inventive step (IS)	Yes:	Claims	-
	No:	Claims	1-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	-

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item VIII

Certain observations on the international application

1) Lack of clarity (Art. 6 PCT)

1.1) Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of a desired result to be achieved ("for coupling the injected signal ..., the injected signal being at the desired frequency ... , thereby causing the magnetron to operate ..."), which merely amounts to a statement of the underlying problem, and which desired result moreover relates to a method of *using* the claimed device (injecting an appropriate signal) rather than clearly defining the device in terms of its technical features.
It is not clear how this result to be achieved by using the device could be limiting for the claimed device as such.

1.2) Similarly, claims 3, 7-9, and the last feature of claim 15 ("cathode ... at ground potential") relate to the use, or to results to be achieved by the use, of the respective claimed device. It is unclear how these method features could be limiting for the claimed devices as such.

1.3) The vague and relative term "non-contact coupling" in **claim 2** has no well-recognised meaning and renders the scope of this claim unclear.

1.4) Claims 9 and 12-14 are unclear in that their features are undefined or contradictory to the features of the claims they depend on.

1.5) Unclear and relative terms cannot be used to establish novelty or inventive step of the claimed subject-matter (cf. PCT-Guidelines, 5.34).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2) Cited documents

Reference in made to the following documents:

D1: GB-A-2 266 180 (EEV LIMITED) 20 October 1993 (1993-10-20)
D2: US-A-5 162 698 (KATO ET AL) 10 November 1992 (1992-11-10)
D3: US-A-2 556 181 (HANSEN WILLIAM W) 12 June 1951 (1951-06-12)
D4: TREADO T A ET AL: "Phase control of crossed-field devices for HPM power combining" CONFERENCE RECORD - ABSTRACTS. 1990 IEEE INTERNATIONAL CONFERENCE ON PLASMA SCIENCE (CAT. NO.90CH2857-1) 21-23 MAY 1990 OAKLAND, CA, USA, 21 May 1990 (1990-05-21), pages 131-132, XP010004989 IEEE New York, NY, USA
D5: US-A-2 880 356 (CHARLES DANIEL ET AL) 31 March 1959 (1959-03-31)

3) Novelty (Article 33(2) PCT)

3.1) The subject-matter of device **claim 1** is not new over document D1, which discloses all device features of claim 1 (see abstract, figures 1 and 4, and related description on pages 4-7), namely a magnetron comprising a cathode 2 and an anode 1, the anode surrounding the cathode and being arranged to define an interaction space between the cathode and the anode for containing space charge, the magnetron being operable at a desired frequency and having a coupling (the supply rod of cathode 2; or equally coupling 10) which is suitable for coupling an injected phase-locking signal to the cathode (by electrical connection to coupling 2, or via coupling 10 by feeding such a signal to output waveguide 12, e.g. via a circulator) and thereby causing the magnetron to operate according to the signal phase.

The fact that D1 does not mention phase locking is irrelevant for the assessment of novelty, since the claimed magnetron as such cannot be distinguished from the prior art by a particular way of using it (see also item VIII, 1.1). In this context it is also referred to the 2nd embodiment of the application shown in Fig. 13, which has the same device

structure as cathode 2 in D1 (Fig. 1).

3.2) The subject-matter of claim 1 is equally not new over document D2, which discloses a magnetron (any of the two magnetrons in the middle of the structure shown in Fig. 1) comprising a cathode 32 (each of the plural sections designated as 32 in Fig. 1 is a magnetron cathode on its own) surrounded by an anode 12 and an interaction space 22 between the cathode and the anode for containing space charge, the magnetron being operable at a desired frequency and having a coupling (iris 26 and conductor 16) arranged to receive (and actually receiving) an injected signal from both the left and right neighboring magnetrons, which injected signal couples to the cathode; the injected signal being at the desired frequency and having a signal phase, thereby causing the magnetron to operate according to the signal phase (see e.g. abstract).

3.4) The subject-matter of claim 1 is equally not new over each of

- document D3 (cathode 20; or 20+11, both are at negative high voltage and emit electrons, and thus are a cathode, and both are - directly or indirectly - connected to the phase locking RF generator 60), or

- document D4 (abstract 2P3-3, **alternative (4)**: "injection circuits **on the cathode** ... allow the best phase control with the least injection power"; a cathode, an anode, and an interaction space between them are implicit features of any high power magnetron HPM; the significance of "HPM" is clear from abstracts 2P3-4 and 2P3-5 from the same laboratory).

3.5) The subject-matter of method claim 16 is not new over each of D2, D3, or D4 for essentially the same reasons as given in conjunction with claim 1 above.

3.6) The subject-matter of method claim 18 is not new over each of D2 or D4 for essentially the same reasons as given in conjunction with claim 1 above: each of D2 and D4 as cited discloses phase locking a plurality of magnetrons by the same RF locking signal.

4) Article 33(2) and (3) PCT

The claims referring back to claims 1 or 16 only comprise subject-matter relating to

features which are either not clearly limiting (see item 1 above) or known, explicitly or implicitly, from the citations (see the corresponding passages cited in the search report), and moreover are considered to be routine matter to be expected of the skilled person. Therefore these claims cannot serve as a basis for a new independent claim which would meet the requirements of the PCT as to novelty and/or inventive step.

As to claim 2, it is noted that each of the couplings in D1 (item 10), D2, or D3 is in some sense "non-contact", because all these couplings are suitable for propagating the locking signal as a TEM-wave along a coaxial waveguide.

As to claims 13 and 14, it is an obvious modification to use the phase-locked magnetrons of either D2 or D4 as the generators Gn in the accelerator of D5. A synchrotron is a well-known application of a particle accelerator which does not bring about any unexpected effect in conjunction with phase-locking.

Re Item VII

Certain defects in the international application

5) The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

6) Claim 15 is not grouped together with the other claims depending on claim 1 (Rule 6.4(c) PCT).

7) The independent claims are not formulated in the two-part form in accordance with Rule 6.3(b)(i-ii) PCT such that features known in combination from the prior art are placed in the preamble of these claims.

8) The relevant background art disclosed in the documents **D1-D5** is not mentioned in the description, nor are these documents identified therein. Moreover, documents reflecting the prior art described on page 5 lines 21 et seq. and page 1 lines 11 et seq. are not identified in the description (Rule 5.1(a)(ii) PCT).